



Real-Time Payments with Mobile

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Executive Summary

As mobile hardware and software continue to evolve to enable new experiences, the industry has observed advancements in real-time payments and its associated use cases. This includes person-to-person (P2P) payments, check replacement, automated invoice reconciliation, payment initiation on receipt of goods, request for payment, bill payment and emergency disbursements.

Combining real-time payments with mobile capabilities offers a number of advantages to the payments ecosystem, such as instantaneous execution and confirmation and straight-through processing, to name a few. The U.S. Payments Forum developed this white paper to educate stakeholders on the real-time payments use cases currently available to businesses and consumers. It also explores the opportunities and challenges associated with leveraging mobile devices (in this setting) and their impact on real-time payment demand and adoption.

What Are Faster Payments and What are the Benefits?

Real-time payments, or faster payments, are defined as a payment scenario where funds are immediately deducted from the payer's account and made instantly available to the payee. These payments are irrevocable, meaning they can't be reversed once they are complete unless a new transaction is created.

This resource highlights the following key benefits of real-time payments leveraging mobile capabilities:

- Mobile-based payments can be completed anywhere without the need for additional paperwork
- Using the "request for payment" in an instant message enables a precisely timed bill payment from anywhere
- Contextual data and straight-through processing simplify reconciliation and invoice matching
- Risk management can be improved using physical and biometric authentication, geolocation, multi-factor authentication, digital signing capabilities and workflow for multiple approvers
- Users gain stronger security as Personal Identifiable Information (PII) is not required to complete a transaction
- Mobile device cameras can be used to scan QR codes that trigger payments
- Both the payer and payee get are instantly notified when a payment takes place

Business Use Cases

Real-time payments can benefit organizations in business-to-business (B2B), business-to-consumer (B2C) and government-to-consumer (G2C) transactions. These use cases are described in detail in section 3 of the white paper.

In short, real-time payments can enable businesses in a B2B environment to eliminate legacy payment types, like checks, making it easier and faster to reconcile invoices. Additionally, real-time payments can be used to disburse funds from businesses and governments to consumers (e.g. insurance payouts or government benefits), eliminating the need to mail checks. This not only allows consumers to receive funds more efficiently, but also allows them to better track payments through real-time notifications for

each transaction. It provides stronger security for consumers as the payer is able to send the disbursement to a mobile phone number which the consumer has linked to their desired account rather than providing their bank details directly.

Consumer Use Cases

Real-time payments can have a tremendous impact on the consumer experience. In addition to being able to complete a transaction anywhere, users can also benefit from security and fraud checks that ensure the validity of the transaction.

Consumers can take advantage of the below mentioned use cases:

- **P2P:** In this scenario, person A is able to pay person B by looking up their identifier (e.g. a handle, phone number, email address or name) to complete the transaction.
- **Bill Payment:** Billers can send a request for payment via push notification or SMS requesting payment for goods or services that the consumer can then click through to an app or URL to complete the transaction.
- **Merchant-Presented QR Codes:** In this example, a merchant displays a QR code on its point of sale (POS) device or on a sticker for the consumer to scan with their phone to initiate the payment via their mobile wallet. The merchant is then notified once the transaction is complete. This can be used for in-person and online use cases.
- **Customer-Presented QR Codes:** In this use case, the consumer presents a QR code on their mobile device that is then scanned by the merchant at checkout to confirm the payment type and complete the transaction. This can only be used for in-person payment

Adoption Considerations for Real-Time Payments with Mobile

While real-time payments are already playing an important role in advancing how we pay, there are a number of challenges that must be addressed to promote significant traction in the market.

Payments stakeholders should consider these potential hurdles, described at length in section 5 of the document:

- Ubiquity and reach
- Financial institution participation rates
- Alias-based directories supporting real-time payments
- Implementation standards for real-time payments via qr codes
- Risk management and security
- Liability education gaps highlighted by recent P2P fraud news

The U.S. Payment Forum's [Mobile and Touchless Payments](#) working committee crafted this white paper with collaboration from additional Forum members. Stakeholders interested in real time payments on mobile are strongly encouraged to consult with their respective payment networks, acquirer processors,

and appropriate professional and legal advisors regarding all aspects of security and implementation, prior to any implementation decisions.

1. Introduction

Real-time payments use cases have been emerging that depend on the availability of a mobile experience for their adoption and growth, such as mobile bill payments and disbursements. Despite the recognized benefits of these use cases, building the mobile experience has challenges and considerations that need to be addressed to lay the groundwork for mobile adoption.

This white paper explores real-time payments use cases and describes how the mobile experience can drive adoption and contribute to the overall growth in real-time payments in the market. Understanding the opportunities and challenges associated with extending mobile use cases for real-time payments is a critical first step toward growing demand and adoption. Other faster payment types (e.g., faster ACH payments, original credit transfers) may be considered in future papers.

The target audience for this paper includes corporations/businesses, retailers, real-time payments providers/networks, financial institutions, and processors.

2. What Are Faster Payments?

Real-time or instant payments are defined by the Bank for International Settlements as a payment in which the transmission of the payment message and the availability of final funds to the payee occur in real time or near-real time on, or as near to, a 24-hour and seven-day (24/7) basis as possible.¹ Real-time payments are a form of faster payments that are gaining traction in the U.S. market. Table 1 provides a high-level comparison of common faster payments types in the U.S. marketplace.

Table 1. Faster Payments in the U.S. Market

Payment Type	Payment Credentials	Description	Key Considerations	Network Example
Real-time or Instant Payments	Account-to-account credit transfers	Credit transfer payments in which the transmission of the payment message and the availability of final funds to the payee occur in real time 24/7/365	• Payments clear and settle in real time. • Funds are deducted immediately from the payer's account. • Funds are immediately available in the beneficiary's account. • Payments are irrevocable. • ISO 20022 format messaging. • Domestic service.	The Clearing House RTP, ² FedNow ³
Faster ACH Payments	Account-based debit and credit payments	Payments in which the funds are available to the payee on a same-day basis on business days	• Payments clear and settle in a batch during specific ACH clearing windows; e.g., ACH payment files are submitted by 10:30am ET and settle at 1:00 pm ET. • Funds are deducted the same day from the payer's account.⁴ • Funds are available the same day in the beneficiary's account.⁴ • Payments are revocable. • NACHA ACH format messaging. • Domestic service.	Same day ACH
Original Credit Transfer Credit, Push Payment, or Debit Card Push	Card-based credit transfer	Payment transfer in which the funds are delivered using the beneficiary card details	• Payments clear in real-time and settle in a batch during specific payment network clearing windows. • Funds are deducted the same day from the payer's account. • Funds are available in near-real time in the beneficiary's account. • Payments are irrevocable. • ISO 8583 format messaging. • Global service.	Visa Direct, Mastercard Send

¹ "Fast payments: Enhancing the speed and availability of retail payments," Bank for International Settlements, November 8, 2016, <https://www.bis.org/cpmi/publ/d154.htm>.

² <https://www.theclearinghouse.org/payment-systems/rtp>.

³ To be introduced mid-2023, <https://www.frb services.org/financial-services/fednow/about.html>.

⁴ If the settlement window is met; otherwise, funds are available the next day.

To define terminology, a **credit transfer** is a method in which funds are pushed into a bank account; with a credit transfer, the payer requests the funds to be sent to a payee/merchant. In contrast, a **debit transfer** is a method in which the payer authorizes the payee/merchant to pull funds from the payer's account. Most traditional credit and debit card transactions are debit/pull transfer payments with the card providing the information required to draw funds from the payer's account.

This paper focuses on **real-time or instant payments** as defined above. The other faster payment methods included in the table may be considered in future papers.

2.1 Benefits of Real-Time Payments with Mobile Capabilities

Combining real-time payments with mobile capabilities offers a number of benefits including:

- A mobile payment can be performed from anywhere, without paperwork.
- Using the "request for payment" in an instant message enables a precisely timed bill payment from anywhere.
- Contextual data and straight-through processing simplify reconciliation and invoice matching.
- Risk management can be improved, with:
 - Use of authentication and fraud tools; e.g., physical and behavioral biometric authentication, digital signing, geolocation matching, other security capabilities
 - Step-up authentication; e.g., a text message to confirm payment in response to request to pay
 - Workflow with multiple approvers
- The mobile device camera can be used to scan QR codes to trigger payments.
- The payer and payee get instant notification/confirmation of the payout.
- Bank account information does not need to be provided.

3. Business Use Cases

Real-time payments can benefit organizations for business-to-business (B2B), business-to-consumer (B2C) and government-to-consumer (G2C) transactions.

3.1 B2B Use Cases

Important business goals are to improve working capital management and streamline procure-to-pay or order-to-cash processes. The problems with current U.S. B2B payments are lack of data, difficulty in reconciling payments to invoices or purchase orders, and manual processes. An estimated 40% of B2B payments in the U.S. today are still made by paper check,⁵ and the accounts receivable and accounts payable processes are built around checks.

The benefits of real-time payments to businesses include access to immediate, irrevocable funds and receipt of extended data that accompanies the payment message, which in turn dramatically streamlines reconciliation. Combining these capabilities with mobile allows businesses to eliminate legacy payment types, like checks, which can be lost, have non-sufficient funds, and be very difficult to reconcile with invoices. The benefits of using mobile-enabled real-time payments include:

- Mobile payments and request for payment in an instant message enable a precisely timed payment from anywhere, without paperwork.
- Large B2B transactions are often protected with additional controls. Use of mobile can support multiple approvers for a transaction.
- Additional fraud checks can be done such as geo-location, behavioral biometrics, and physical biometrics.
- The mobile device camera can be used to scan QR codes or bills of lading in warehouses to verify receipt and automatically trigger payments.

3.2 B2C and G2C Use Cases

Faster payments can be used for disbursements from businesses and governments to consumers (e.g., disbursing insurance payouts and government benefits) and eliminate the need to mail checks. Sending a disbursement to the consumer's mobile device:

- Allows instant consumer notification of the payout.
- Eliminates the need for the payee to provide bank account information. The payer sends the disbursement to a mobile phone number and the consumer links their desired bank account to their mobile phone number.

⁵ "B2B Payments: 40% Are Made With Paper Checks," PYMNTS, March 15, 2022, <https://www.pymnts.com/news/b2b-payments/2022/b2b-payments-40-are-made-with-paper-checks/>.

4. Consumer Use Cases

This section explores consumer use cases that show how mobile capabilities can augment the real-time payment experience. Example advantages offered by pairing mobile and real-time payments include:

- A mobile payment can be performed from anywhere, without paperwork.
- Additional fraud checks can be done using mobile device functionality, such as geo-location, behavioral biometrics, and physical biometrics.
- Using the “request for payment” in an instant message enables a precisely timed bill payment from anywhere.

4.1 Person-to-Person Payment (P2P)

Figure 1 illustrates two uses cases using a P2P mobile app, where Person A sends \$20 to Person B. For both Persons A and B, funds appear to transfer instantly. Settlement between Person A’s bank and Person B’s bank may or may not be instantaneous, depending on the payment network used.

In the payment use case (Figure 1, left), Person A finds Person B in a directory using an identifier (e.g., phone number, email address, name) and sends Person B a payment after selecting the person, verifying the name and potentially a picture, and optionally verifying something that is not available in directory.

In the request-for-payment uses case (Figure 1, right), Person B finds Person A in the directory and sends a request for payment to Person A; Person A then sends the payment to Person B.

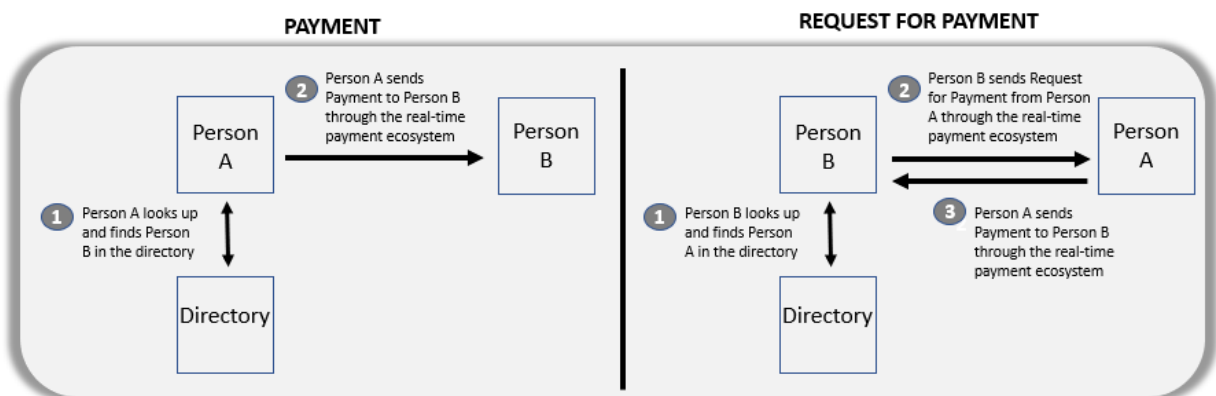


Figure 1. P2P Payment Use Cases

4.2 Bill Payment

For a bill payment use case, a biller may send a request for payment via a push notification or SMS; for example, sending “would you like to pay?” and providing a URL to create a push credit (to the biller) transaction. The transaction can include biller and invoice data that will allow the biller to more easily reconcile the payment to the invoice.

A request for payment could also be used to trigger the payment of recurring charges, such as for subscriptions.

4.3 Purchase at a Point of Sale with a QR Code

Use of quick response (QR) codes to initiate payments at the point of sale (POS) is growing. With QR codes, consumers use digital wallets to share credentials for mobile payments. For example, in China, India, and Sweden, consumers have adopted mobile QR code payments at the point of purchase because of the quick and seamless purchase experience.

Typically, two QR code options are used at the point of sale: merchant presented or customer presented QR codes. In both QR code presentation options, funds are transferred from the payer's account to the payee's account.

QR-code-based systems can be very cost effective since they may not require expensive, specialized POS payment devices.

However, security is a concern with most QR code systems since QR codes can be easily copied. Most QR code solutions use the QR code as an identifier, with a second authentication factor also used before the payment is processed.

4.3.1 Merchant Presented QR Codes

With merchant presented QR codes, the merchant POS device or a sticker at the merchant's location displays a QR code. Typically, the POS device shows a dynamic QR code where the QR code has a unique transaction identifier for the payment transaction. A dynamic QR code helps to uniquely identify the transaction for reporting; a static QR code on a sticker would lack the necessary information to identify the purchase transaction.

With this approach, the customer scans the merchant displayed QR code with their mobile device to initiate the payment using their digital wallet, verifies the amount, and accepts paying the merchant. The merchant typically receives immediate notification via a text message or alert that the customer's payment was received and the merchant completes the purchase transaction. The merchant waits for the notification to deliver the product and service.

Merchant presented QR code solutions can be implemented for both in-person and online purchases.

In some cases, the customer may have the option to add a tip after the purchase has been completed.

4.3.2 Customer Presented QR Codes

With customer presented QR codes, the merchant scans a QR code displayed on the customer's mobile device at the time of checkout. The merchant typically uses a QR code scanner connected to the POS system or uses a phone camera as a scanner to read the customer's QR code data. The merchant uses the scanned QR code data to initiate a request for payment from the customer's bank. Once approved by the customer's bank and/or the customer, the customer's bank initiates a credit transfer to the merchant's bank account with appropriate real-time notification of the payment.

Customer presented QR codes are typically used for an in-person payment.

5. Adoption Considerations for Real-time Payments with Mobile

While real-time payments already play an important role in the payments marketplace, gaining significant traction will need a number of challenges to be addressed. In addition, new mobile capabilities provide opportunities for further enhancing the benefits of implementation.

Ubiquity and reach. Real-time payments via mobile devices currently face interoperability challenges. The TCH RTP network is live in the U.S., with a second network planned for launch in 2023 (the Federal Reserve's FedNow network); however, these two networks, along with other faster payment approaches (e.g., other international instant networks), are not interoperable. This lack of interoperability creates friction when it comes to developing and enabling the real-time payment mobile experiences.

Financial institution participation rate. For a real-time payment to flow successfully, both the sending and receiving financial institutions must be set up and participate in the payment network being used. At present, thousands of domestic financial institutions are not set up to send and/or receive payments on real-time networks; until the majority of financial institutions participate in these networks, solution providers and merchants will not be motivated to develop and offer solutions to consumers and businesses. FedNow's launch in mid-2023 is widely expected by the payments industry to further accelerate these participation rates.

Alias-based directories supporting real-time payments. Alias-based directories⁶ with significant scale and/or interoperability can help to reduce friction and increase efficiency for real-time payments. At present, the alias-based directories supporting real-time payment solutions are closed-network directories that do not interoperate with other directories. Additionally, these directories are currently used primarily for P2P payments; extending to business use cases would help to accelerate investment and adoption at the POS and with B2B use cases.

Implementation standards for real-time payments via QR codes. In other markets around the globe, QR code payments have generally helped to accelerate real-time payments adoption and scale of implementation and also specifically helped to grow mobile payment adoption. At present, standards and specifications for real-time QR code payments have not been defined by the domestic U.S. networks. Options could include (among others): the EMVCo QR code specifications being used in other markets; new standards developed by the American National Standards Institute (ANSI); or new standards based on ISO 20022 standards and developed specifically for domestic QR code payments.

Risk management and security. Given the relative newness of real-time payments, financial institutions and other ecosystem participants are still getting comfortable with their risk profile and security requirements, since real-time payments are instant and irrevocable.

Layering a new method of payment (such as QR code) on top of a new real-time payments network naturally presents security considerations and concerns. Additional industry education would help inform the ecosystem on best practices and increase industry confidence. Multiple types of QR codes for payment can be used (e.g., static vs. dynamic, merchant-presented vs. consumer-presented). It is important that participants in a transaction understand the risk of fraud (e.g., scams, account takeover), and the mitigation and security measures that can help to effectively manage this risk.

⁶ For example, an alias-based directory would allow consumers and/or businesses to link mobile numbers or email addresses to payment credentials.

New tools are emerging that can help to mitigate risk and fraud. As mobile driver's licenses become more commonplace, they are another tool available for validating identity. Digital identities could be used to validate identity in real time during in-person transactions, such as picking up a to-go food order or a buy-online-pickup-in-store goods order.

Liability education gaps highlighted by recent P2P fraud news/reports. Recent reports of fraud and scams using real-time P2P payments have highlighted potential consumer confusion and education gaps about who bears the responsibility for loss in the case of fraud, particularly for authorized push payments. As real-time payments with mobile scale, liability education should be emphasized.

6. Conclusion

Combining real-time payments with mobile capabilities offers a number of benefits to the payments ecosystem, including instantaneous execution and confirmation, precise payment timing, contextual data, straight-through processing, and improved risk management tools.

Many real-time payments use cases, both for businesses and consumers, benefit from mobile capabilities, including check replacement, automated invoice reconciliation, payment initiation on receipt of goods, request for payment, P2P payments, bill payment, QR code payments, and emergency disbursements.

A number of challenges need to be overcome by the industry to pave the way for real-time payments, including ubiquity, alias directories, QR code standards, security, and fraud. The rich capabilities offered by mobile devices provide opportunities to overcome many of these challenges. The mobile experience can drive adoption of these use cases, contributing to overall growth in real-time payments.

7. Acknowledgements

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